

USSN 09/401,730  
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Docket No.: 161-P-DAL035BUS01

27. (Twice Amended) Optical equipment comprising;  
at least one optical fibre, and  
an optical apparatus comprising at least one photo-element, and a supporting element provided with at least one guide hole, having an axis, for a respective one of said at least one optical fibre, and  
a device for connecting said at least one optical fiber to a respective one of said at least one photo-element,  
wherein said connecting device comprises a slide provided with at least one slot having a semi-circular portion having an axis, said slide being movable between a first and a second predetermined position, said second predetermined position being defined by stops, said axis of said semi-circular portion of said at least one slot, in said first position of said slide, being coaxial with said axis of said at least one hole of said supporting element and freely housing said at least one optical fibre, and said axis of said semi-circular portion of said at least one slot, in said second position of said slide, being out of alignment with said axis of said at least one hole and exerting on said at least one optical fibre a force which keeps said at least one optical fibre secured in said at least one hole, wherein said slide is made from transparent material.

#### REMARKS

Claims 1 - 18 and 22 - 29 are pending in this application. Claims 5, 9, 14, 22, 26 and 27 have been amended for clarity. Attached hereto (identified as "Version With Marking To Show Changes Made") is a marked-up version of the changes made to the claims.

Specifically, independent claims 5, 14, 26 and 27 have been amended to clarify the description related to being "coaxial" and being "out of alignment." The clarifying language added specifies that the slot in the slide has a semi-circular portion having an axis and subsequent references to "coaxial" and "out of alignment" are made with respect

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to the axis of this semi-circular portion and the axis of the hole. Support for this additional language can be found in Figures 1, 2 and 5 and in the specification on page 5, lines 13-15. No new matter has been added.

Claims 5 and 26 have also been amended to clarify that the slide is "one-piece" and that the slot is a "fixed-size." Support for this additional language can be found in the drawings. No new matter has been added.

Claims 14 and 26 have also been amended to clarify that the slide is made from a transparent material which makes a region of optical alignment in coupling between the optical fibre and the photo-element visible. Support for this additional language can be found in the specification on page 1, lines 26-27; page 4, lines 1-10; and page 7, lines 23-27. No new matter has been added.

Claim 9 has been amended to make it consistent with the semi-circular language added to claim 5, from which claim 9 depends.

Claim 14 has also been amended near the end to replace the word "the" with the word "said" for consistency in the claim.

Claim 22 has been amended in the first line to replace the word "Connecting" with the word "Securing" for consistency with claim 5 from which claim 22 depends.

Claims 26 and 27 have also been amended in the second line to replace the word "fiber" with the word "fibre" for consistency in the claim.

#### **Rejections under 35 USC § 112, Second Paragraph**

Claims 5 – 17 and 26 – 29 have been rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With the amendments made to claims 5, 14, 26 and 27, these rejections are respectfully traversed.

While applicant believes that claims were not indefinite, nevertheless, in order to advance the progress of the present application, claims 5, 14, 26 and 27 have been amended to improve clarity to specify that the hole has an axis, that the slot recited in the

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claims has a semi-circular portion having an axis, that it is the axis of the semi-circular portion of the slot which is co-axial with the axis of the hole and that it is the axis of the semi-circular portion of the slot which is out of alignment with the axis of the hole.

The hole of the supporting element has manifestly an axis passing through the centre and extending in a plane perpendicular to the plane of the hole. Similarly, the semi-circular portion of the slot has manifestly an axis passing through the centre of the circumference of the semi-circular portion and extending in a plane perpendicular thereto. Thus, it is clear, and not at all indefinite, that the term "co-axial" in the amended claims refers to the axis of the hole of the supporting element and the axis of the semi-circular portion of the slot and means that the two axes are coincident with each other. Similarly, it is clear, and not at all indefinite, that the term "out of alignment" in the amended claims means that the two axes do not coincide or, in other words, that the axis of the hole of the supporting element and the axis of the semi-circular portion of the slot are not coaxial, but rather are eccentric.

The Examiner's interpretation that "when the slot 9 is out of alignment, no areas of the slot align with hole" is incorrect. The revised wording of the claims now makes this absolutely clear. It is merely necessary that the axes of the hole and the semi-circular portion of the slot are out of alignment.

Further, the Examiner's interpretation that "a slot is coaxial with a hole when any part of a slot aligns with a hole" is also incorrect. The revised wording of the claims makes it perfectly clear that hole and the semi-circular portion of the slot are coaxial when the axes of both components are essentially coaxial. It is not enough that any part of the components overlap.

Thus, especially with the revised wording of the claims requiring a semi-circular portion of the slot and reciting the coaxial nature and out of alignment nature of the axes of the hole and semi-circular portion of the slot, independent claims 5, 14, 26 and 27 should no longer be rejectable under 35 USC § 112 as being indefinite.

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In addition, claims 6 – 17, 22, 28 and 29 should no longer be rejectable under 35 USC § 112 as being indefinite by virtue of their dependency on an indefinite claim since claims 5, 14, 26 and 27, the claims from which they depend, are not indefinite.

**Rejections under 35 USC § 102 and 35 USC § 103 over Takeuchi et al**

Claims 1, 2 and 23 have been rejected under 35 USC § 102(b) as being anticipated by Takeuchi et al (U.S. Patent No. 4,720,630). Further, claims 3, 4, 18, 24 and 25 have been rejected under 35 USC § 103(a) as being unpatentable over Takeuchi et al. These rejections are respectfully traversed.

The Examiner argues that “since the fiber and the photo element structures of Takeuchi et al are not molded from a single integral body, the elements releasably connect.” This argument is respectfully traversed.

In contrast, Takeuchi et al explicitly teaches that:

- The electric terminals 2a mounted in terminal block 2 are connected by soldering to one end of the electronic circuit board 1 (column 3, lines 14-17);
- The ceramic stem 3 on which a light emitting element 31a and a light receiving element 31b are mounted is connected by soldering to the other end of the electronic circuit board 1 (column 3, lines 19-27);
- The terminal block 2 and the cylindrical case 4 are fixed to each other by caulking, adhesion etc. (column 3, lines 26-27);
- Fiber cables 6a and 6b are fixed in the guide hole 5b of the fiber holder 5 by caulking ring 5c (column 3, lines 28-34); and
- Fiber holder 5 and cylindrical case 4 are fixed to each other by caulking, adhesion etc. (column 3, lines 32-34).

Thus, parts 1, 2, 3, 4, 5 and 6 are directly or indirectly rendered integral or permanently connected with one another. Indeed, parts 1, 2 and 3 are integral or permanently connected with one another; parts 5 and 6 are integral or permanently

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connected with one another; and parts 5 and 4 are integral or permanently connected with one another.

Taken together, the clear reading of Takeuchi et al reveals that there is no teaching of a releasable connection. In contrast, Takeuchi et al explicitly teaches unreleasably coupling the components so that the assembly can not reasonably be releasably connected.

Thus, Takeuchi et al fails to show or suggest a "device for releasably connecting" as the rejected claims explicitly recite. The clear reading of Takeuchi et al provides an opto-electric transformation connector which can be used as if it were an electric connector (see the Abstract and column 1, lines 57-59). The connector is a fibre cable provided with two electrical terminals, 2a and 2b as shown in the Figures. The electric terminals are to be releasably connected to electrical apparatuses (not shown), but the optical connector is manifestly intended to be "one-piece" and its internal components are not intended to be releasably connected.

In addition, Takeuchi et al provides for windows 4a and 7a in the cylindrical case 4 and the protecting cover 7, cut-offs in the ceramic stem 3 and the fiber holder 5 and a transparent cover 8 inserted between the cylindrical case 4 and the protecting cover 7 (column 4, lines 13-25). All these provisions allow only for a small aperture 7a (Figure 6) allowing excess light emitted by the light emitting element 3a to be viewed from outside (column 4, lines 26-29); column 1, line 66 to column 2, line 2). In other words, Takeuchi et al provides for a light path to determine whether or not the light emitting element is functioning, but does NOT provide for a region of optical alignment to be externally visible as required by the claims. That is, the connector of Takeuchi et al does NOT provide an externally visible means to determine to the optical alignment of the connected optical fibres.

Thus, Takeuchi et al fails to show or suggest the presently claimed invention. Claims 1, 18 and 23 all contain the requirement that the optical fibres are releasably connectable and that the device make a region of optical alignment in coupling be externally visible. Claims 2-4 and 24-25 also inherently contain the requirement since

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claims 2-4 and 24-25 depend from one of claims 1 and 23. Takeuchi et al fails on both counts to show or suggest such a structure.

Thus, the rejections of claims 1-4, 18 and 23-25 under 35 USC § 102 and 35 USC § 103 over Takeuchi et al are improper and should be withdrawn.

**Rejections under 35 USC § 102 over Yamada et al**

Claims 5 – 7, 9 – 11, 22 and 26 have been rejected under 35 USC § 102(b) as being anticipated by Yamada et al (U.S. Patent No. 4,986,625). With the amendments made to claims 5 and 26, these rejections are respectfully traversed.

The Examiner interprets “the wide-mouth opening part of 22” to be the claimed “slot” of the present invention. The Examiner states that this “wide-mouth portion” is coaxial with the hole in the supporting element in a first position (Figure 4B) and out of alignment with the hole in the supporting element in a second position (Figure 4C) and exerts “on the optical fibre a force which keeps the optical fibre secured in the hole.” This interpretation is respectfully traversed.

Sketch A in the attachment illustrates what is believed to be the Examiner’s interpretation. It can be clearly seen in the sketch, taken from Figures 4B and 4C of Yamada et al, the “wide-mouth portion” of the slot (as interpreted by the Examiner) does NOT exert any pressure whatsoever on the optical fibre and especially does NOT exert on the optical fibre a force which keeps the optical fibre secured in the hole. The “wide-mouth portion” of the slot is, in fact, out of contact with the fibre.

Thus, this interpretation of equivalence between Yamada et al and the presently claimed invention must fail. All of the independent claims rejected above require that the slot have a semi-circular portion whose axis not only moves from a first position coaxially aligned with the axis of the hole to a second position out of alignment but also “exert[s] a force on the optical fibre which keeps the optical fibre secured in the hole.” It is clear from Sketch A that the “wide-mouth portion” not only is not semi-circular but fails to exert a force securing the optical fibre in the hole.

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In Sketch B it can be seen that the force on the fibre in Yamada et al is actually exerted by the U-shaped portion of slot 22 when the slide of Yamada et al is in the second position (Figure 4C; column 5, lines 5-6). However, the U-shaped portion of slot 22 is coaxial with the hole 13 in the second position of the slide (Figure 4C) and is out of alignment therewith when the slide is in the first position (Figure 4B). Thus, the arrangement of Yamada et al (using the U-shaped portion of slot 22) is the exact opposite of the arrangement of the present invention in which the axis of the semi-circular portion of the slot is coaxial with the axis of the hole with the slide in the first position. The axis of the semi-circular portion of the slot is out of alignment with the axis of the hole when the slide is in the second position where a force is exerted on the fibre which keeps the fibre secured in the hole.

Yamada et al fails in any case to show or suggest a slide having a semi-circular portion which acts in accordance with the presently claimed invention.

Applicant notes that the Examiner in section 11 of the Official Action mailed April 12, 2002 refers to notch 30 of Figure 2 of the present application as corresponding to the narrow portion of slot 22 of Yamada et al. The Examiner equates notch 30 to be the equivalent of the "narrow portion" of the slot in Yamada et al and the semi-circular portion 9 to be the equivalent of the "wide-mouth portion" of the slot in Yamada et al. This interpretation is also incorrect. Notch 30 in the present invention is disclosed as having "the function of imparting elasticity to arm 10" and has nothing to do with securing the fibre. Further, the shapes and functional operation of the elements are inconsistent as described above. The claims now specify a semi-circular portion of the slot of the present invention. The "wide-mouth portion" of Yamada et al is not semi-circular and does not function as required by the claims. The "narrow portion" of Yamada et al also does not function as required by the claims. The equivalence is simply missing.

It is worth noting in passing that if the whole slot 22 of Yamada et al would be regarded as the claimed slot, it can easily be seen that its axis would be above the axis of the hole in the first position (Figure 4B) and below the axis of the hole in the second

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position (Figure 4C). That is, in this interpretation, it would be always be out of alignment.

Thus, it can be seen that the rejections of claims 5 and 26, and claims 6-7, 9-11 and 22 which depend from claim 5, under 35 USC § 102 over Yamada et al are improper and should be withdrawn.

#### **Rejections under 35 USC § 102 over Welber et al**

Claims 5, 8 - 10, 12, 26 and 28 have been rejected under 35 USC § 102(b) as being anticipated by Welber et al (U.S. Patent No. 4,605,280). With the amendments made to claims 5 and 26, these rejections are respectfully traversed.

An explanation of the construction and operation of Welber et al may be helpful to illustrate the impropriety of the rejection over Welber et al, illustrated by the attached Sketches C, D and E.

Cable holder 40 having upper notch 46 and a semi-circular cut-out (not numbered, but visible in Figure 2) is fixedly connected to frame 26. Cable support 56, having lower notches 62 and 64 and semi-circular cut-out 69, is slidingly supported within frame 26. (It is to be noted that the lower circle shown in Figure 3 represents glass disc 52, while the upper, partly broken circle might be representative of hole 38 (labeled 37 in Figure 4).

In a low position of cable support 56 (Sketch C), when the springs 82 are at maximum compression, the square hole is the widest for freely housing the fibre and the misalignment of its axis with the axis of the hole 38 is maximum.

When a fibre is inserted in the square hole, and the pressure manually applied against the springs is released, the cable support moves upward until the square hole encloses the fibre, and the fibre resistance equals the force exerted by the springs.

For a comparatively small fibre (Sketch D), there will be a small square hole and a small force F1 acting on the fibre. A gap, even if small, will exist between the cable support 66, 68 and fixed part 50.



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For a comparatively larger fibre (Sketch E), there will be a big square hole and a small force F2 acting on the fibre. A larger gap will exist between the cable support 66, 68 and fixed part 50.

The Examiner's arguments of equivalence between Welber et al and the claimed invention fails are discussed below.

First, Welber et al discloses a device with a slide which is the combination of pieces 40 and 58. Piece 40 is fixed. Only piece 58 moves. In contrast, the present invention now claims a single-piece slide. Having a single-piece slide as explicitly claimed is advantageous because it avoids assembly steps.

Second, the slot of Welber et al, as identified by the Examiner, in operation actually modifies its size in response to the size of the fibre inserted. In contrast, the present invention now claims a fixed size slot.

Third, the Examiner argues that the second position of the slide in Welber et al is defined by stops "when 66 and 68 hits 50." This argument is incorrect. As seen above, arms 66, 68 of cable support 56 are merely upwardly urged by springs 82 towards contact with frame 26 ("limited in movement by the encasement of housing 50"), but may only reach contact when there is no fibre at all: in the uppermost position of cable support 56, i.e., when the arms 66, 68 are in contact with frame 26, the square hole formed by notches 46, 62, 64 would be absent or so small that no fibre could be within it.

Thus, the device in Welber et al discloses a series of positions of the slide where the slide exerts a force to secure the fibre, the actual position being a function of the diameter of the fiber. Thus, Welber et al does NOT show or disclose a second position of the slide which is limited by stops as explicitly required by the claims. Rather the second position is limited by size of the fibre and force applied to the fiber.

In the arrangement disclosed in Welber et al, the force exerted on the optical fibre secured in the hole is variable with fibre's (connector) diameter because the size of the square hole, and, therefore, the extent of compression of springs 82, is a function of the

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fiber's (connector) diameter, as explained above. Thus, in a range of diameters accepted by the adapter, at least some fibers could be over-forced and, possibly, damaged.

Conversely, in the present application it is explained (page 4, lines 24-26; page 7, line 27 to page 8, line 2) that one of the advantages of the present invention is providing a predetermined force on the optical fibre. The problem addressed by the invention over Welber et al is that of avoiding any damage to the fibre. This problem is solved by providing that in the second position of the slot, the degree of misalignment with the hole, and therefore the securing force exerted upon the fibre, is predetermined. One faced with this problem would find no suggestions in Welber et al because Welber et al is concerned with the opposite problem of rendering the securing device universal for variety of fibre sizes.

Thus, the rejections of independent claims 5 and 26, and claims 8-10, 12 and 28 which depend from claims 5 and 26, under 35 USC § 102 over Welber et al are improper and should be withdrawn.

#### **Rejections under 35 USC § 103 over Welber et al in view of Kato**

Claims 13 – 17, 27 and 29 have been rejected under 35 USC § 103(a) as being unpatentable over Welber et al in view of Kato (U.S. Patent No. 5,555,333). With the amendments made to claims 5, 14, 26 and 27 (from which the rejected claims depend), these rejections are respectfully traversed.

The Examiner has admitted that Welber et al does not disclose the slide, cover and supporting element made from a transparent material. The Examiner suggests that Kato discloses making the substrate "from transparent glass" (section 8, line 7 of the Official Action). However, in addition to making substrate 22 of transparent material, Kato also teaches that the fibre optic coupling area uses a metal layer 32 deposited so as to cover the surface of the groove 25 as a reflective coating. It can be seen that the substrate 22 covers the ends of the fibre optic cables (as shown in Figures 10A and 10B) and clearly prevents any visibility of the coupling area. Since metal layer 32 covers the ends of the fibre optic cables, the coupling area can not be externally visible.

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Thus, Kato can not be used to supply the teaching "that by making material transparent, alignment of the elements would be easier" as alleged by the Examiner. Without such teaching in Kato, the Examiner's rejection of claims 13-17, 27 and 29 under 35 USC § 103 must fail.

Also, the rejection of claims 13-17, 27 and 29 under 35 USC § 103 also fail because neither Welber et al nor Kato disclose nor suggest a slot having a semi-circular portion operating as in the present invention as discussed above. The independent claims from which these claims depend, being allowable, should also render these claims allowable.


Thus, the rejections of claims 13-17, 27 and 29 under 35 USC § 103 over Welber are improper and should be withdrawn.

#### Summary

With the amendments made and the arguments provided, claims 1 – 18 and 22 – 29 should now be allowable, this application should be in condition for allowance and a notice to that effect is earnestly solicited.

Respectfully Submitted,

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William D. Bauer  
Registration No. 28,052

IPLM Group, P.A.  
Broadway Place West, Suite 6600  
1300 Godward Street NE  
Minneapolis, Minnesota 55413-1741  
Telephone: 612-331-7405  
Facsimile: 612-331-7401

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## **VERSION WITH MARKINGS TO SHOW CHANGES MADE**

### **In the Claims**

5. (Four Times Amended) A securing device for connecting at least one optical fibre to an optical apparatus, said optical apparatus comprising at least one photo-element, said at least one optical fibre connectable to said at least one photo-element, and at least one supporting element provided with at least one guide hole, having an axis, for said at least one optical fibre, wherein said device comprises
- a single-piece slide provided with at least one fixed-size slot[,] having a semi-circular portion having an axis, said slide moveable between a first and a second predetermined position, said second position being defined by stops, said axis of said semi-circular portion of said slot, in said first position of said slide, being coaxial with said axis of said hole of said supporting element and freely housing said at least one optical fibre, and said axis of said semi-circular portion of said slot, in said second position of said slide, being out of alignment with said axis of said hole and exerting on said at least one optical fibre a force which keeps the at least one optical fibre secured in said hole.
9. (Thrice Amended) Securing device according to claim 5, wherein said semi-circular portion of said slot [comprises a semi-circular portion having] has a radius greater than a radius of said at least one optical fibre.
14. (Four Times Amended) A securing device for connecting at least one optical fibre to an optical apparatus, said optical apparatus comprising at least one photo-element, said at least one optical fibre connectable to said at least one photo-element, and at least one supporting element provided with at least one guide hole, having an axis, for said at least one optical fibre, wherein said device comprises

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a slide provided with at least one slot having a semi-circular portion having an axis, said slide moveable between a first and a second predetermined position, said second position being defined by stops, said axis of said semi-circular portion of said slot, in said first position of said slide, being coaxial with said axis of said hole of said supporting element and freely housing said at least one optical fibre, and said axis of said semi-circular portion of said slot, in said second position of said slide, being out of alignment with said axis of said hole and exerting on said at least one optical fibre a force which keeps [the] said at least one optical fibre secured in said hole, wherein said slide is made from transparent material making a region of optical alignment in coupling between said at least one optical fibre and said at least one photo-element externally visible.

22. (Once Amended) [Connecting] Securing device according to claim 5, wherein said at least one photo-element is mounted on said supporting element.

26. (Once Amended) Optical equipment comprising:

at least one optical [fiber] fibre,

an optical apparatus comprising at least one photo-element, and a supporting element provided with at least one guide hole, having an axis, for a respective one of said at least one optical fibre, and

a device for connecting said at least one optical fibre to a respective one of said at least one photo-element,

wherein said connecting device comprises a single-piece slide provided with at least one fixed-size slot having a semi-circular portion having an axis, said slide being movable between a first and a second predetermined position, said second predetermined position being defined by stops, said axis of said semi-circular portion of said at least one slot, in said first position of said slide, being coaxial with said axis of said at least one hole of said supporting element and freely housing said at least one optical fibre, and said axis of said semi-circular portion of said at least one slot, in said second position of said slide, being out of

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alignment with said axis of said at least one hole and exerting on said at least one optical fibre a force which keeps said at least one optical fibre secured in said at least one hole, said slide being made from a transparent material making a region of optical alignment in coupling between said at least one optical fibre and said at least one photo-element externally visible.

27. (Twice Amended) Optical equipment comprising:

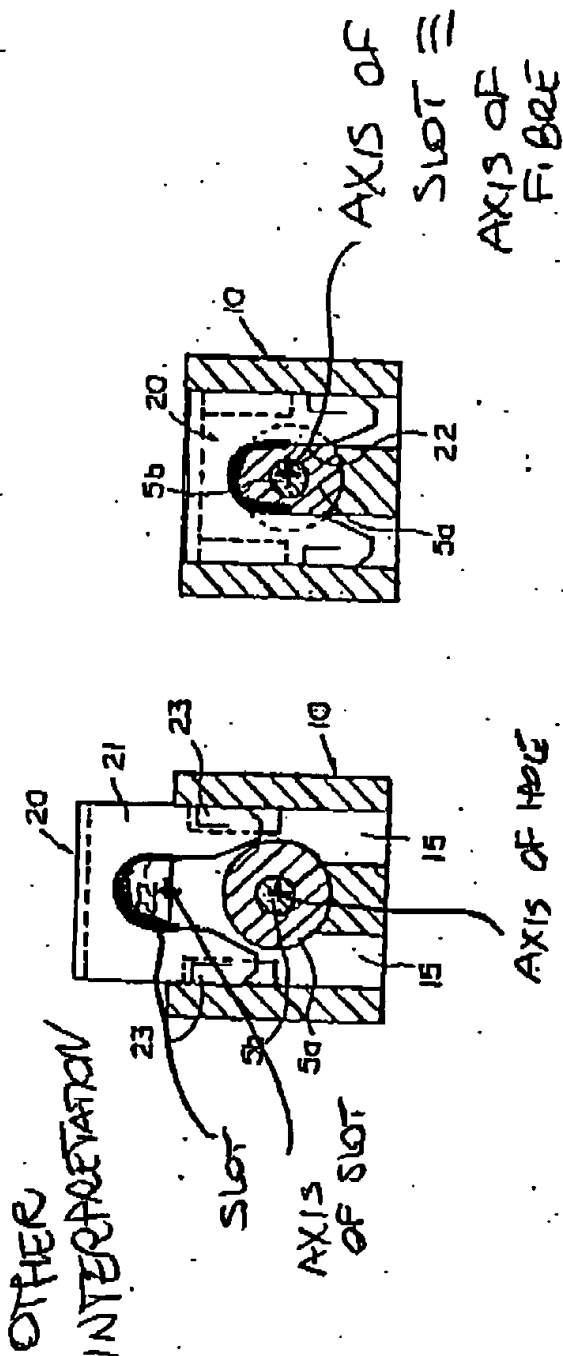
at least one optical [fiber] fibre, and

an optical apparatus comprising at least one photo-element, and a supporting element provided with at least one guide hole, having an axis, for a respective one of said at least one optical fibre, and

a device for connecting said at least one optical fiber to a respective one of said at least one photo-element,

wherein said connecting device comprises a slide provided with at least one slot having a semi-circular portion having an axis, said slide being movable between a first and a second predetermined position, said second predetermined position being defined by stops, said axis of said semi-circular portion of said at least one slot, in said first position of said slide, being coaxial with said axis of said at least one hole of said supporting element and freely housing said at least one optical fibre, and said axis of said semi-circular portion of said at least one slot, in said second position of said slide, being out of alignment with said axis of said at least one hole and exerting on said at least one optical fibre a force which keeps said at least one optical fibre secured in said at least one hole, wherein said slide is made from transparent material.

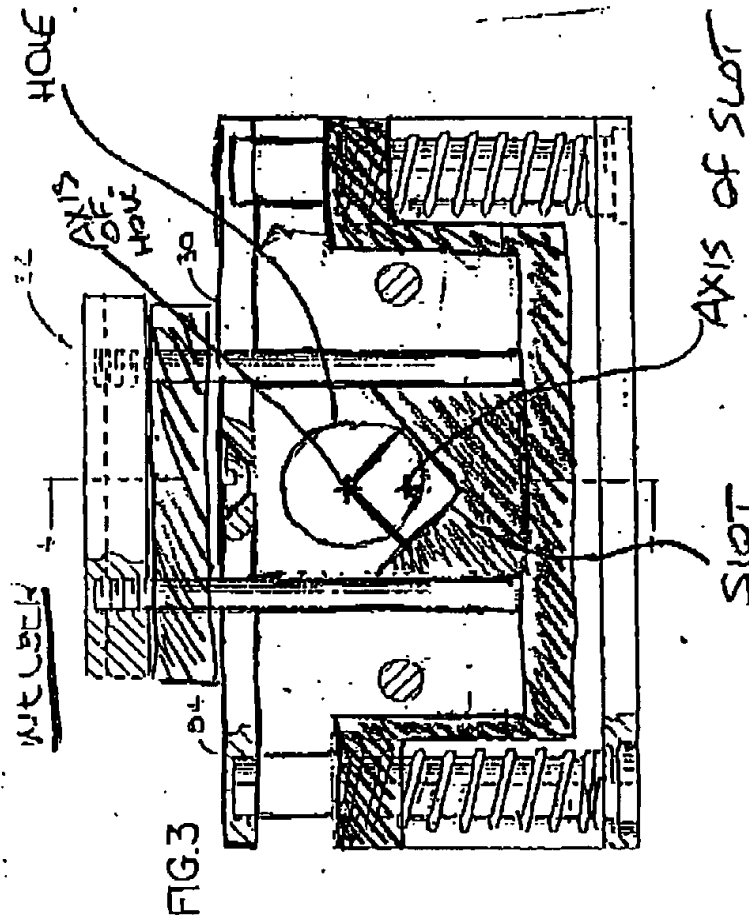




- OUT OF ALIGNMENT
- COAXIAL
- FREELY HOUSING FIBRE
- FORCE ON FIBRE
- REVERSE WORKING

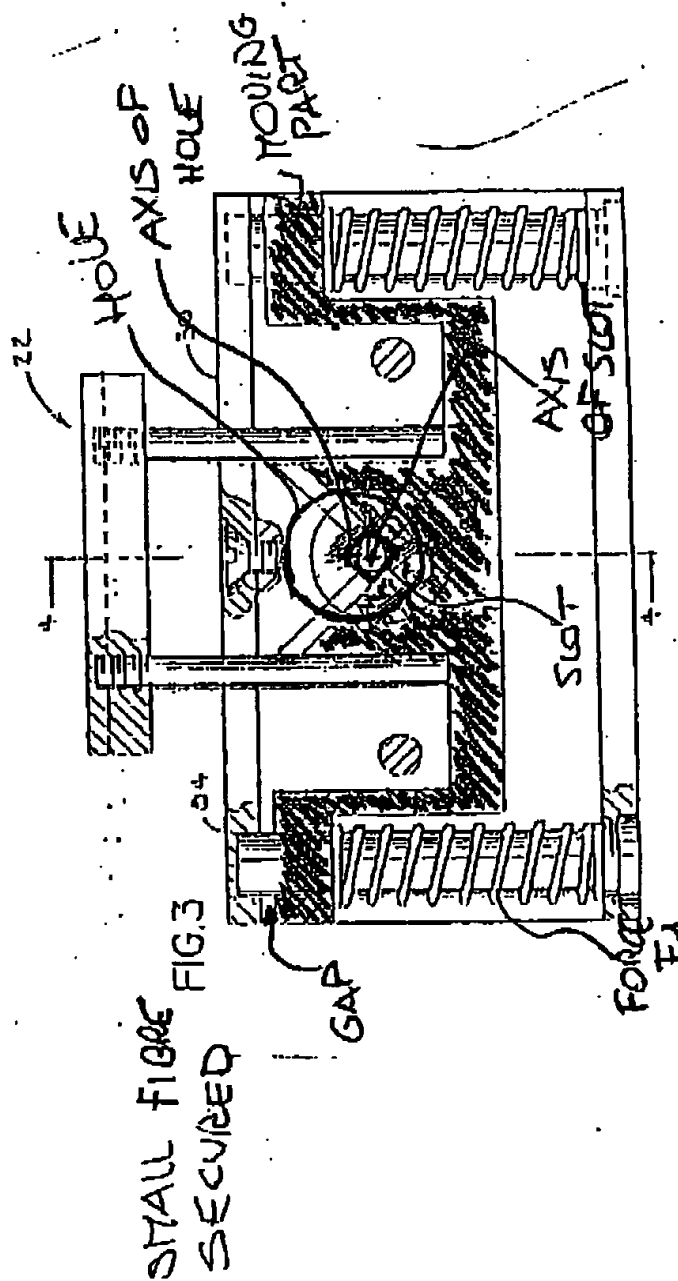
SKETCH B





SKETCH C

INSERTION  
OF FIGURE



## SKETCH D

